

A Descriptive Study on the Seasonal Pattern of COVID-19 Admissions in a Tertiary Care Centre in Western Tamil Nadu (2020–2022)

Rajkumar A¹, Vanitha G², Preethi A³

¹Assistant Professor, Department of Physiology, Government Medical College Namakkal, Namakkal, Tamil Nadu, India. ²Assistant Professor, Department of Pharmacology, Government Medical College Namakkal, Namakkal, Tamil Nadu, India. ³Assistant Professor, Department of Pharmacology, Government Medical College Krishnagiri, Krishnagiri, Tamil Nadu, India

Abstract

Background: The coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has exhibited varied transmission patterns globally. While many respiratory viruses, such as influenza, display distinct seasonal cycles, the influence of climate on SARS-CoV-2 transmission, particularly in tropical regions like Western Tamil Nadu, remains a subject of considerable debate. Understanding the temporal trends of COVID-19 is crucial for optimizing public health preparedness and resource allocation. This study aimed to describe the pattern of COVID-19 admissions at a tertiary care hospital in Western Tamil Nadu and to assess potential seasonal variations. **Material and Methods:** We conducted a retrospective descriptive study at the Government Medical College Hospital, Namakkal. Data on all reverse transcription-polymerase chain reaction (RT-PCR) confirmed COVID-19 hospital admissions were collected from March 2020 to February 2022. Temporal trends were analyzed monthly to identify peaks and troughs and to evaluate any potential association with local seasonal patterns. **Results:** The analysis revealed two distinct major waves of admissions. The first wave peaked in August–September 2020, coinciding with the Southwest Monsoon season. The second and more severe wave peaked in May 2021, a period of peak summer heat. A minor resurgence was noted in January 2022. The lack of a consistent, annually recurring pattern across the study period suggests that seasonal climatic factors did not primarily drive the observed surges. **Conclusion:** Our findings indicate that COVID-19 admission trends in Western Tamil Nadu did not follow a predictable seasonal pattern. The fluctuations observed were likely influenced by non-climatic factors such as the emergence of new variants, population immunity, and public health interventions. This underscores the critical to effectively manage unpredictable disease surges, continuous, year-round public health preparedness and surveillance are important.

Keywords: COVID-19, Seasonal variation, Hospital admissions, Tertiary care centre, Western Tamil Nadu, Epidemiology, Descriptive study, Pandemic trends, Climatic factors, Disease pattern, SARS-CoV-2, Temporal distribution, Public health, Infection trends.

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INTRODUCTION

The emergence of COVID-19 has prompted extensive research into the factors influencing its transmission dynamics. A key area of inquiry has been the role of seasonality, as observed with other respiratory viruses. Seasonal patterns, often linked to climate variables such as temperature and humidity, can significantly impact the stability of a virus and host behavior. In temperate climates, COVID-19 has, at times, shown increased transmission during colder months, echoing the pattern of influenza. However, the dynamics in tropical regions are less understood.

Western Tamil Nadu is characterized by a hot and humid climate for much of the year, with distinct seasons including a hot summer (March–June), a monsoon season (June–October), and a cooler period (November–February). Respiratory illnesses like dengue and influenza often show a seasonal increase, particularly during or after the monsoon. This study was initiated to determine if a similar pattern could be observed for COVID-19 would have significant implications for regional public health policy and resource planning.

MATERIALS AND METHODS

Study Design: This was a retrospective, descriptive study.

Study Setting: The study was conducted at Government Medical College Hospital, a major tertiary care center in Namakkal, Tamil Nadu, serving a large population in the western part of the state.

Data Collection: We retrospectively collected data on all COVID-19 admissions confirmed by a positive RT-PCR test result from the hospital's electronic health records and daily ward admission registers. The study period was from March 2020 to February 2022.

Inclusion/Exclusion Criteria: All patients (adults and pediatrics) with an RT-PCR confirmed COVID-19 diagnosis

Address for correspondence: Dr. Rajkumar A,
Assistant Professor, Government Medical College Namakkal, Namakkal,
Tamil Nadu, India.
E-mail: rajkumarmusic13@gmail.com

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admitted to the hospital during the study period were included. Patients with a clinical suspicion of COVID-19 but a negative or equivocal RT-PCR test result were excluded from the analysis.

Statistical Analysis: Data were compiled into a monthly time series. We used a descriptive approach to analyze the temporal trends of admissions, identifying peak periods and comparing them with the local seasonal calendar. No inferential statistical tests were performed to correlate admissions with specific climatic variables.

RESULTS

A total of 5,264 COVID-19 admissions were recorded during the 24-month study period.

First Wave (March 2020 – December 2020): The initial surge of cases began to escalate in July 2020, reaching its

peak in August (588 admissions) and September (511 admissions). Admissions then gradually declined to a low of 64 in December 2020. This peak coincided with the latter half of the Southwest Monsoon season.

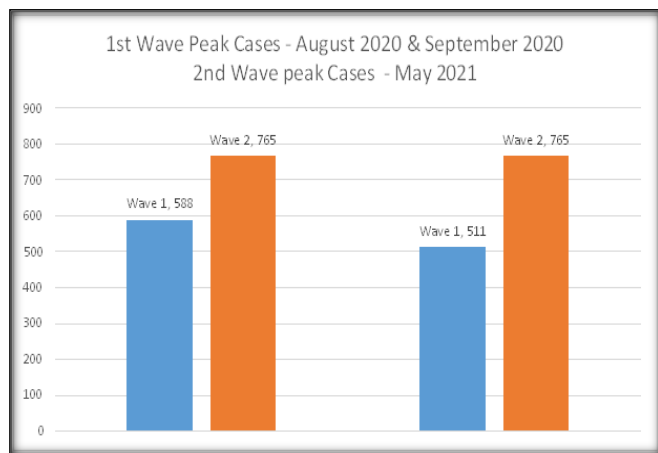
Second Wave (February 2021 – December 2021): A more explosive wave began in February 2021. It peaked significantly in May 2021 with 765 admissions, the highest monthly admissions in the entire study period. This peak occurred during the height of the summer season. Admissions subsequently decreased sharply, reaching low numbers by December 2021.

Early 2022 Resurgence: A minor but notable resurgence of admissions (232 admissions) was observed in January 2022, likely reflecting the Omicron variant wave. This was followed by a rapid decline to 66 admissions in February 2022 and zero new admissions in March 2022.

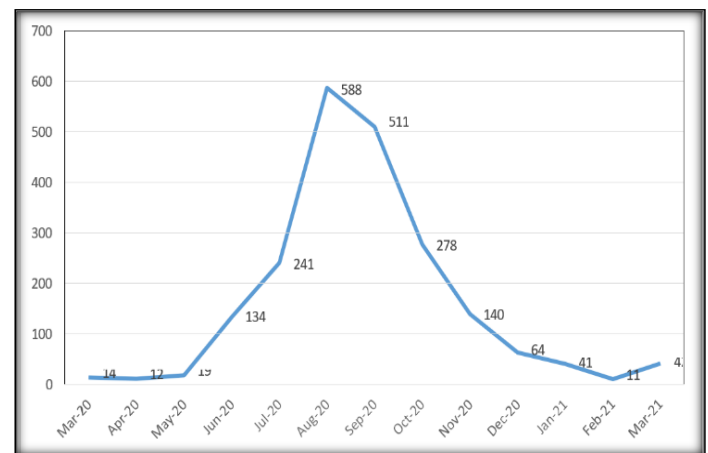
A summary of key monthly data points is presented in [Table 1].

Table 1: Monthly Trends of COVID-19 Admissions at Government Medical College, Namakkal (2020–2022)

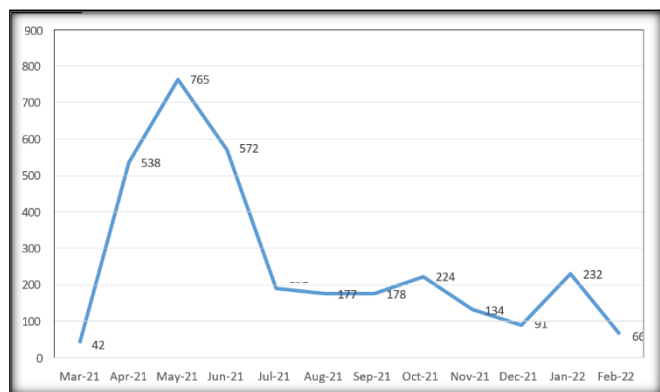
Month	RT PCR Positive Admission	Cumulative Admission	Discharge	Cumulative Discharge	Death	RT PCR Test Done	RTPCR (Swab) Positive
Mar-20	14	14	0	0	0	NIL	NIL
Apr-20	12	26	26	26	0	NIL	NIL
May-20	19	45	16	42	1	554	6
Jun-20	134	179	108	150	0	4938	24
Jul-20	241	420	279	429	3	10669	545
Aug-20	588	1008	424	853	9	17189	1131
Sep-20	511	1519	507	1360	4	37636	1764
Oct-20	278	1797	316	1676	6	29102	1173
Nov-20	140	1937	169	1845	1	31082	355
Dec-20	64	2001	53	1898	0	37226	266
Jan-21	41	2042	90	1988	0	37994	157
Feb-21	11	2053	41	2029	0	28395	80
Mar-21	42	2095	34	2063	0	31173	224
Apr-21	538	2633	472	2535	3	45744	3029
May-21	765	3398	690	3225	43	35295	6763
Jun-21	572	3970	569	3794	45	55149	3028
Jul-21	192	4162	222	4016	8	56035	910
Aug-21	177	4314	154	4150	12	53295	643
Sep-21	178	4517	174	4344	10	60713	797
Oct-21	224	4741	191	4535	6	49436	786
Nov-21	134	4875	147	4682	5	40182	540
Dec-21	91	4966	98	4780	3	58684	452
Jan-22	232	5198	213	4993	2	55716	5980
Feb-22	66	5264	90	5083	1	27981	751
Mar-22	0	0	0	0	0		
TOTAL	5264		5083		162	804188	29404



1st Wave



2nd Wave



DISCUSSION

This study provides a detailed account of COVID-19 admission patterns in a tertiary care center in Western Tamil Nadu over two years. The most salient finding is the absence of a consistent seasonal trend. While the first wave in 2020 peaked during the monsoon season, the subsequent, larger wave in 2021 peaked during the summer. This temporal incongruity strongly suggests that the drivers of these surges were not a predictable seasonal climate pattern.

These findings align with several global studies that have found the seasonality of SARS-CoV-2 to be either weak or non-existent, particularly compared to other respiratory viruses. The virus's transmission appears to be more heavily influenced by non-climatic factors, a conclusion supported by the literature. The rapid succession of different waves can be better explained by the emergence of new, more transmissible variants (e.g., Delta in mid-2021 and Omicron in early 2022), changes in population behavior, the lifting or imposition of public health restrictions, and evolving levels of population immunity.

The peak in May 2021, coinciding with the devastating second wave in India, was likely driven by the highly transmissible Delta variant, which overwhelmed healthcare systems nationwide. The resurgence in January 2022 corresponds with the global spread of the Omicron variant. These events, rather than local weather conditions, appear to be the primary determinants of the observed surges.

The implications for public health are profound. In contrast to endemic seasonal diseases like influenza or dengue, for which preparedness can be cyclical, COVID-19

requires a constant state of readiness. To manage unpredictable surges throughout the year, health systems in tropical regions must ensure continuous availability of essential resources, including hospital beds, medical personnel, oxygen supply, and diagnostic and therapeutic capabilities.

CONCLUSION

COVID-19 admissions in this tertiary care center in Western Tamil Nadu did not exhibit a consistent seasonal pattern over the study period. The observed waves were more likely due to dynamic epidemiological factors, such as variant evolution

and changes in public health policy, rather than predictable climatic cycles. This research underscores the need for robust, continuous, and year-round surveillance and preparedness to effectively manage the ongoing threat of future surges in tropical and temperate climates.

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Conflicts of interest

There are no conflicts of interest.

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